# SECTION V. MAINTENANCE

## 7.5.1 INTRODUCTION

This section provides the preventive and corrective maintenance procedures for the present weather sensor. Preventive maintenance consists of checking the lens and hood headers, cleaning lenses on the transmitter and receiver heads, and calibrating the sensor. Corrective maintenance is performed by running the system diagnostic test on the sensor to identify any faulty module. Failure of a power supply may prevent the system diagnostic test from running. Therefore, additional procedures are provided for checking power supply voltages. Detailed removal and installation procedures are provided for each field replaceable unit (FRU) in the present weather sensor.

## 7.5.2 PREVENTIVE MAINTENANCE

Preventive maintenance for the present weather sensor is performed every 90 days and consists of checking the lens and hood heaters, cleaning the lenses on the transmitter and receiver heads, and calibrating the sensor. Once each year the sensor must be treated with the insect paint.

7.5.2.1 **Checking Lens and Hood Heaters**. The present weather sensor lens and hood heaters are not automatically tested by the sensor's internal diagnostics. As such, the maintenance technician must manually check the heaters every 90 days and whenever a problem with the heaters is suspected. The lens heaters are on all the time. Hood heaters are turned on whenever the sensor is reporting snow (S) or heavy snow (S+) or whenever the beam is completely blocked. Since checking the heaters requires a touch test of the lens, the transmitter and receiver lenses should be cleaned after this test (paragraph 7.5.2.2). Table 7.5.1 provides the procedure to check the operation of the present weather sensor lens and hood heaters.

7.5.2.2 **Cleaning Transmitter and Receiver Lenses**. Generally, moderate dust buildup and scratches on the transmitter and receiver lenses will not effect sensor accuracy or sensitivity. However, as preventive maintenance, the lenses on the transmitter and receiver heads should be cleaned every 90 days. Individual sites may require more frequent cleaning if there are a significant number of problems noted due to dirty lenses. Before cleaning the lenses, power should be removed from the present weather sensor by setting the circuit breakers on sensor circuit breaker module (located in the DCP) to the off (right) position. After removing power, a soft optics brush should be used to remove dust or dirt that may scratch the lenses. The lenses are then cleaned using lint-free lens cleaning tissues and lens cleaning solution. A drop of cleaning solution is applied to the tissues, and the lenses are then cleaned by wiping each lens in a circular fashion.

7.5.2.3 **Calibration**. The present weather sensor must be calibrated every 90 days or after any corrective maintenance action. Before calibration, the sensor must be properly installed and must pass its ASOS diagnostic checks. Table 7.5.2 provides the procedures to calibrate the present weather sensor. Calibration is accomplished using the laptop computer to issue present weather sensor B and C commands and receive the sensor's responses. Paragraph 7.4.4 contains a detailed description of the sensor responses.

7.5.2.4 **Present Weather Sensor Spider Paint Application Procedure**. This procedure is used to treat (paint) the present weather sensor with an insecticide material. The sensor should be painted once each year. The entire sensor head (excluding hoods), sensor pole, and pedestal must be painted. The purpose is to create a long, treated path over which climbing insects have to traverse before reaching the optical path of the present weather sensor. The insecticide, a product called INSECTA, is a milky white, latex based liquid that, when dry, is relatively benign to humans but deadly to spiders and insects. The insecticide is present in crystals that are released when an insect walks on the treated surface. The present weather sensor spider paint application procedure is provided in table 7.5.3.

### 7.5.3 CORRECTIVE MAINTENANCE

The present weather sensor calibration should be checked using the INITIAL CALIBRATION check of table 7.5.2 prior to further corrective maintenance. The present weather sensor contains elaborate fault isolation circuitry and software that enable fault isolation to an FRU. Although these diagnostics are very reliable, if they fail to execute properly, the technician should troubleshoot the sensor using the procedures in table 7.5.4. Each procedure should be performed in the order listed until the problem is corrected. If the sensor cannot be repaired using these procedures, the sensor's detailed block diagrams should be referenced and troubleshooting performed. After repair, the on-demand test should be performed on the present weather sensor to verify system operation. The system should then be monitored until the continuous self-test (CST) completes its routine test of the complete system. After the completion of CST, the system maintenance log should be reviewed to ensure that the system is operating properly.

### 7.5.4 FRU REMOVAL AND INSTALLATION

7.5.4.1 **Frame Head Assembly Removal and Installation**. The procedures required to remove and install the present weather sensor frame assembly are provided in table 7.5.6.

7.5.4.2 **Heater Power Supply Removal and Installation**. The procedures required to remove and install the present weather sensor heater power supply are provided in table 7.5.7.

7.5.4.3 **Analog Power Supply Removal and Installation**. The procedures required to remove and install the present weather sensor analog power supply are provided in table 7.5.8.

7.5.4.4 **Digital Power Supply Removal and Installation**. The procedures required to remove and install the present weather sensor digital power supply are provided in table 7.5.9.

7.5.4.5 **Circuit Board Removal and Installation**. The procedures required to remove and install the present weather sensor circuit boards are provided in table 7.5.10.

7.5.4.6 **Fiberoptic Module Removal and Installation**. The procedures required to remove and install the present weather sensor fiberoptic module are provided in table 7.5.11.

7.5.4.7 **Heater Bar Assembly Removal and Installation**. The procedures to remove and install the heater bar assembly are provided in table 7.5.12.

7.5.4.8 **Card Rack Assembly Removal and Installation**. The procedures to remove and install the card rack assembly are provided in table 7.5.13.

7.5.4.9 **Main Electrical Enclosure Removal and Installation**. The procedures to remove and install the main electrical enclosure are provided in table 7.5.14.

**Table 7.5.1. Lens and Hood Heater Touch Test**

| Step | Procedure |
|---|---|
| | **WARNING**<br>While lens and hood heaters will be hot, they will not cause burns to skin if lightly touched for short periods of time.<br><br>**NOTE**<br>Laptop computer initialized as DCP OID (Chapter 3, Section III), or any other available OID, may be used for the following procedure. |
| 1 | At OID, display sensor status page (sequentially press REVUE-SENSOR-STAT) function keys from 1-minute display. |
| 2 | On sensor status page, set report processing for present weather sensor to OFF. |
| 3 | Briefly touch part of transmitter and receiver lenses where heater is attached from outside. Verify that heaters are warmer than ambient temperature. |
| 4 | Block beam between transmitter and receiver head for 3 to 5 minutes. |
| 5 | Briefly touch transmitter and receiver hood heaters and verify that heaters are warmer than ambient temperature. If lens (window) and/or hood heaters are not working, check 24-volt dc power supply for discontinuity in heater circuit as follows:<br><br>a. Check 24-volt heater power supply located on the left side of LEDWI electronic box. Connect a DMM at power supply 2MT2A1PS1 V+ and V- pins. If 24 volts dc is not present, replace power supply; otherwise, check lens and hood heaters for continuity.<br><br>b. Remove connectors J4 and J5 from electrical enclosure. Measure resistance on J5 connector (transmitter) between pins C and D (lens heater) and pins G and H (hood heater). Measure resistance on J4 connector (receiver) between pins D and E (lens heaters) and pins G and H (hood heater). Reference Section 7.4.4. |
| 6 | Clean transmitter and receiver lenses in accordance with paragraph 7.5.2.2. |
| 7 | On sensor status page at OID, set report processing for present weather sensor to ON. |

**Table 7.5.2. Present Weather Sensor Calibration**

| Step | Procedure |
|---|---|
| | Tools required:<br>Large flat-tipped screwdriver<br>STI LEDWI calibration kit<br>Small flat-tipped screwdriver<br>Laptop interface (Y-shaped) cable<br>Laptop computer with PROCOMM Plus installed<br><br>**NOTE**<br>Power to the LEDWI must be cycled OFF, then ON anytime the beam is interrupted. This occurs during optics cleaning and when the adjustable tube is installed and removed. |
| | **INITIAL SETUP PROCEDURE** |
| 1 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to off (right) position. |
| 2 | Clean lenses on transmitter and receiver heads in accordance with paragraph 7.5.2.2. |
| 3 | Install adjustable tube from calibration kit between transmitter and receiver heads. |

**Table 7.5.2. Present Weather Sensor Calibration -CONT**

| Step | Procedure |
|---|---|
| 4 | Using large flat-tipped screwdriver, open present weather sensor main electrical enclosure access door.<br><br>**NOTE**<br>After removing transmitter board, place it inside and at the bottom of the electrical enclosure to keep it warm and dry. |
| 5 | At present weather sensor main electrical enclosure, remove transmitter board from top slot of card rack and install TST-200 test modulator board from calibration kit into same slot. |
| 6 | Using small flat-tipped screwdriver, disconnect DB-9 connector from fiberoptic module inside main electrical enclosure. |
| 7 | Using laptop computer interface (Y-shaped) cable, connect RS-232C (COM1) port of laptop computer to DB-9 connector removed from fiberoptic module. Close electrical enclosure door as far as possible without damaging interface cable. |
| 8 | Turn on laptop computer and initialize PROCOMM Plus program. After program initializes, press any key to enter terminal mode (blank) screen. |
| 9 | Using ALT-S command (setup facility), set up the following TERMINAL OPTIONS:<br><br>a. Terminal emulation: VT220<br>b. Duplex: FULL<br>c. Soft flow control (XON/XOFF): OFF<br>d. Hard flow control (CTS/RTS): OFF<br>e. Line wrap: OFF<br>f. Screen scroll: OFF<br>g. CR translation: CR/LF<br>h. BS translation: NON-DESTRUCTIVE<br>I. Break length (milliseconds): 350<br>j. Enquiry: OFF<br>k. EGA/VGA true underline: OFF<br>l. Terminal width: 80<br>m. ANSI 7 or 8 bit commands: 8 BIT |
| 10 | Press ESC key to exit to terminal mode (blank) screen. |
| 11 | Using ALT-P command (line/port option), set CURRENT SETTINGS as follows:<br><br>a. Baud rate: 1200<br>b. Parity: NONE<br>c. Data bits: 8<br>d. Stop bits: 1<br>e. Port: COM1 |
| 12 | Press ESC key to return to terminal mode (blank) screen. |
| 13 | Using ALT-F1 (open log) command, open log file to record calibration data. In response to prompt for file name, use the following format:<br><br>PWMMDD.CAL<br><br>where MMDD is current month/date. |

**Table 7.5.2. Present Weather Sensor Calibration -CONT**

| Step | Procedure |
|---|---|
| 14 | On laptop computer, set CAPS LOCK to ON.<br><br>**CAUTION**<br>The installation of the TST-200 test modulator board causes the hood heaters to be turned on continuously. Temperature of the hood and lens area can exceed 200 degrees Fahrenheit. Do not touch the hood or lens. Serious burns may result. Use extreme caution while installing and removing the calibration tube. |
| 15 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to on (left) position. Wait at least 2 minutes for sensor to warm up and stabilize before proceeding. |
| 16 | At laptop computer, type B. Computer displays the following report:<br><br>WNPP1234S567890<br><br>Verify that report is correct. Wait 10 minutes before proceeding. |
| **INITIAL CALIBRATION CHECK** | |
| 1 | Ten minutes after above step is completed, type C. Verify that sensor reports:<br><br>WS+PxxxxSxxxxxxXxxx000L---xxxK---xxxH---xxx<br><br>Data denoted by xx indicates that those values are irrelevant to this procedure and should be ignored. Data denoted by --- are values that will be adjusted as necessary during this procedure. |
| 2 | Subtract displayed value of high channel (H---) from value of low channel (L---). Record difference (L-H). |
| 3 | Compare displayed values of low channel, high channel, particle channel, and low/high difference with the following tolerances:<br><br>Low Channel (L-) 240 +/- 4<br>Particle Channel (K-) 400 +/-10<br>High Channel (H-) 174 +/- 4<br>Difference Channel (L-H) 66 +/- 8<br><br>IMPORTANT !!! If all values are within tolerance and the difference between the L (low channel) and the H (high channel) is 66 ±8, proceed to transmit modulator calibration procedure. If not, continue with signal processing calibration procedure below. |

**Table 7.5.2. Present Weather Sensor Calibration -CONT**

| Step | Procedure |
|---|---|
| | **SIGNAL PROCESSING CALIBRATION PROCEDURE** |
| | **NOTE**<br>When making the following adjustments, turn potentiometers no more than 1/4 turn, wait 3 minutes for sensor data averaging, and issue C command again. Repeat as necessary to bring value into specified tolerance. Electronics enclosure door should be closed as much as possible between potentiometer adjustments.<br><br>Do not adjust carrier frequency. This will adversely affect sensor operation; also, adjusting carrier value could mask other malfunctions such as lens fogging, optical misalignment, or degradation of the signal processing cards 1 and 2, the transmitter, and the AGC card.<br><br>If L value, H value, or L-H value was out of tolerance in previous check, both L and H values should be adjusted in the following steps. This is to keep L-H value within 66 ±8 tolerance. If K value was out of tolerance but other values were in tolerance, only K value need be adjusted below. |
| 1 | Low channel (L---) adjustment. Adjust LO potentiometer on signal processor No. 1 (SP1) printed circuit board for L indication of 240 ±4. Adjust LO potentiometer clockwise (cw) to decrease reading or counterclockwise (ccw) to increase reading. The second three digits in L field are not used in calibration. |
| 2 | Particle channel (K---) adjustment. Adjust PAR potentiometer on signal processor No. 2 (SP2) printed circuit board for K indication of 400 ±10. Adjust PAR potentiometer cw to decrease reading or ccw to increase reading. The second three digits in K field are not used in calibration. |
| 3 | High channel (H---) adjustment. Adjust HI potentiometer on signal processor No. 2 (SP2) printed circuit board for H indication of 174 ±4. Adjust HI potentiometer cw to decrease reading or ccw to increase reading. The second three digits in H field are not used in calibration.<br><br>**NOTE**<br>If L and H values were adjusted to proper tolerances, L-H value will automatically be within tolerance. |
| 4 | If adjustments were made to L and/or H value, recalculate L-H value and ensure that L-H value is within 66 ±8 tolerance. Repeat L and H adjustments as necessary to bring L-H value within tolerance. |
| | **TRANSMIT MODULATOR CALIBRATION CHECK PROCEDURE** |
| 1 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to off (right) position. |
| 2 | Inside present weather sensor main electrical enclosure, remove TST-200 test modulator board and install transmitter board. |
| 3 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to on (left) position. Wait at least 5 minutes for sensor to warm up and stabilize before proceeding. |
| 4 | Five minutes after above step is completed, type C. Verify that sensor reports:<br><br>W+P0000SxxxxxxX---000LxxxxxxKxxxxxxHxxxxxx<br><br>Data denoted by xx indicates that those values are irrelevant to this procedure and should be ignored. Data denoted by --- is the carrier channel value. |

**Table 7.5.2. Present Weather Sensor Calibration -CONT**

| Step | Procedure |
|---|---|
| 5 | Verify that first three digits after X (carrier value) is above 350, then proceed to teardown procedure. If value is below 350, remove and replace the following FRU's, in order, and retest carrier channel for value above 350.<br><br>a. Receiver/AGC Board - AlAlA8<br>b. Transmitter Board - AlAlA1<br>c. Signal Processor 1 - AlAlA7<br>d. Microprocessor Board - AlAlA3<br>e. Frame Assembly A2 (This check can be completed with new frame assemblies resting on the ground. The cables must be connected to the electrical enclosure and the calibration tube installed.) |
| | **TEARDOWN PROCEDURE** |
| 1 | At laptop computer, use ALT-F1 command to close log. |
| 2 | At laptop computer, use ALT-X (exit) command to exit PROCOMM Plus. |
| 3 | Turn off laptop computer. |
| 4 | Inside DCP equipment cabinet, set circuit breaker on present weather sensor circuit breaker module to off (right) position. |
| 5 | Disconnect cables between laptop computer and present weather sensor. |
| 6 | Using small flat-tipped screwdriver, install present weather sensor DB-9 connector on fiberoptic module. |
| 7 | Using large flat-tipped screwdriver, close and secure present weather sensor main electrical enclosure access door.<br><br>**CAUTION**<br>The installation of the TST-200 test modulator board causes the hood heaters to be turned on continuously. Temperature of the hood and lens area can exceed 200 degrees Fahrenheit. Do not touch the hood or lens. Serious burns may result. Use extreme caution while installing and removing the calibration tube. The tube that is removed in the next step may be hot. |
| 8 | Remove adjustable tube from sensor heads. |
| 9 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to on (left) position. |

**Table 7.5.3. Present Weather Sensor Spider Paint Application Procedure**

| Step | Procedure |
|---|---|
| | Tools and materials required:<br>Water<br>Clean cloths<br>Eye protection<br>Plastic gloves<br>INSECTA liquid<br>Hand soap<br><br>**WARNING**<br>Follow the recommended directions in this procedure and on the bottle of INSECTA regarding the handling and disposal of INSECTA.<br><br>**NOTE**<br>INSECTA should be applied after replacing present weather sensor head or installing new sensor if ambient temperature is above 55 degrees Fahrenheit (°F). If temperature is below 55°F, it is necessary to remove present weather sensor head and mounting pole and treat indoors at room temperature. Ensure that there is adequate ventilation before painting indoors. The procedure is the same whether present weather sensor is painted indoors or outdoors. |
| 1 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to off (right) position.<br><br>**WARNING**<br>Death or severe injury may result if personnel are not kept out of travel path of sensor. With locking pin removed from hinge plate, sensor is not firmly locked in upright position. |
| 2 | Lower present weather sensor on hinge plate as follows:<br><br>a. Remove locking pin from front part of hinge plate.<br><br>b. From rear of sensor, firmly grasp support pole with both hands and carefully lower sensor on hinge until lanyard catches and supports weight of sensor.<br><br>**CAUTION**<br>When washing sensor head and pole, take care not to wash or otherwise contact sensor lenses. Failure to comply may result in damage to lenses. |
| 3 | Thoroughly wash present weather sensor head and pole with water to remove surface dirt and dry using clean cloth.<br><br>**WARNING**<br>Eye protection and plastic gloves must be worn when performing the following steps and any exposed skin must be covered. |
| 4 | Remove cap from INSECTA bottle and screw on applicator brush with black seal installed in applicator. |

**Table 7.5.3 Present Weather Sensor Spider Paint Application Procedure -CONT**

| Step | Procedure |
|---|---|
| 5 | Squeeze bottle until milky white liquid saturates brush.<br><br>**NOTE**<br>When painting surfaces, do not paint the inside or outside of the black hoods on the present weather sensor head. Apply an even, thick coat of INSECTA but avoid applying so much that it runs. |
| 6 | Using Section 7.5.1 as a guide, brush INSECTA on all white surfaces of present weather sensor head, both mounting plates (upper surface of top plate and lower surface of bottom plate), and pole. Also paint the 18-inch high galvanized mounting pedestal and hinge plate. It is not necessary to paint the main electrical enclosure box. |
| 7 | Allow treated surfaces to dry 2 to 3 hours before touching. |
| 8 | Using clean water and rags, clean up any spills and applicator brush.<br><br>**WARNING**<br><br>With locking pin removed from hinge plate, sensor is not firmly locked in upright position. Death or severe injury may result if personnel are not kept out of travel path of sensor. |
| 9 | Raise present weather sensor on hinge plate as follows:<br><br>a. From rear of sensor, firmly grasp support pole with both hands and carefully raise sensor on hinge into upright position.<br><br>b. Install locking pin into front of hinge plate. |
| 10 | Dispose of dirty rags, plastic gloves, and INSECTA bottle, when it is empty, by sealing in plastic bag and placing bag in trash can. |
| 11 | Use soap and water to thoroughly wash hands to remove any traces of INSECTA. |
| 12 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to on (right) position. |

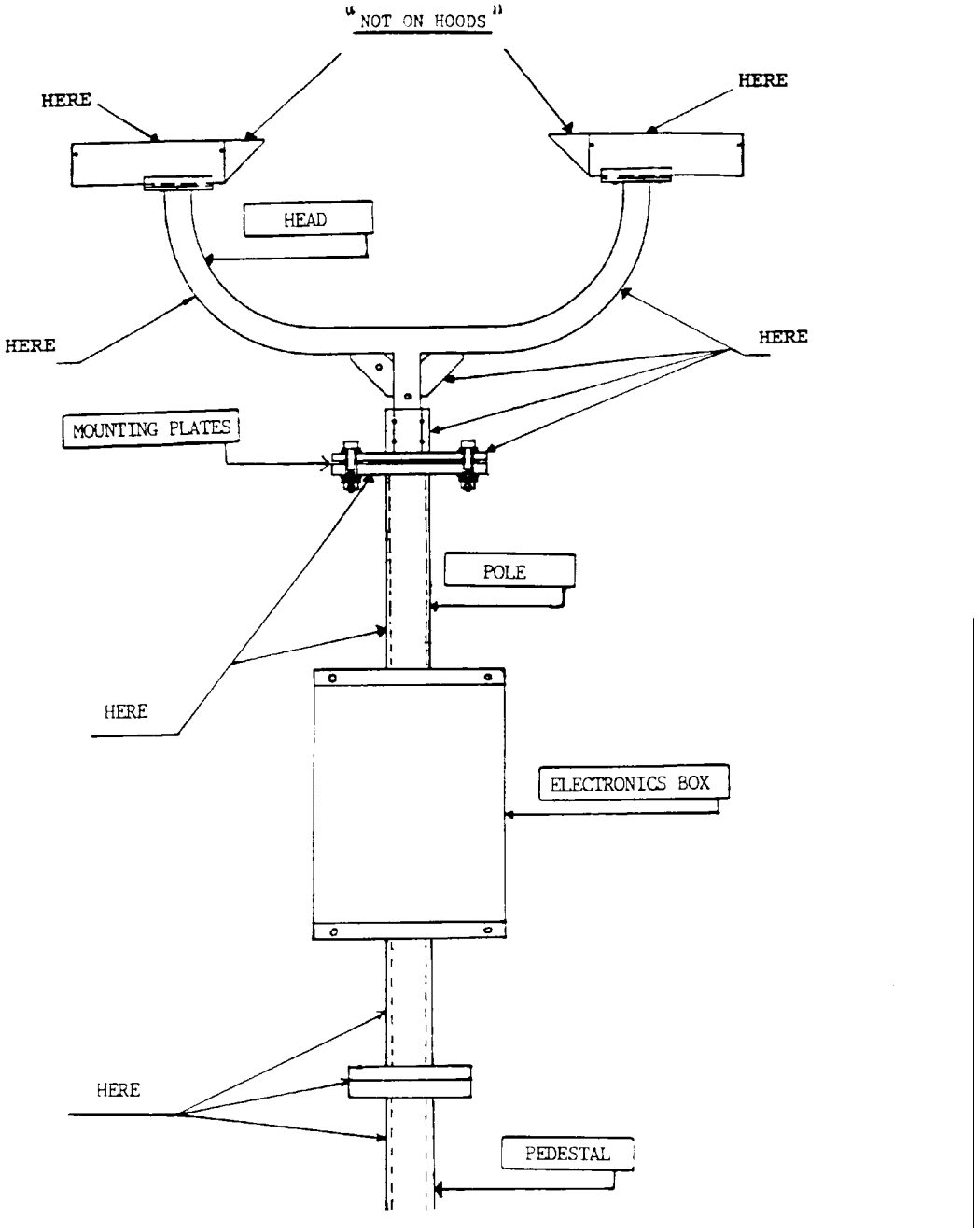


**Figure 7.5.1. Present Weather Sensor Insect Treatment Areas**

**Table 7.5.4. Present Weather Sensor Troubleshooting**

| What to Do | How To Do It |
|---|---|
| Check system maintenance log and replace indicated FRU. | Tables 7.5.6 - 7.5.9 |
| Perform fiberoptic module test. | Chapter 1, Section V |
| Perform present weather sensor power supply test | Table 7.5.5 |
| Replace Microprocessor Board A1A3. | Table 7.5.10 |

**Table 7.5.5. Present Weather Power Supply Test**

| Step | Procedure |
|---|---|
| | Tools required:<br>Large flat-tipped screwdriver<br>No. 1 Phillips screwdriver<br>Digital multimeter (DMM)<br><br>**WARNING**<br><br>Hazardous voltages are present in present weather sensor. Exercise proper safety procedures to avoid possible injury or death.<br><br>**NOTE**<br>Because the microprocessor board is powered by digital power supply PS3, this power supply is tested first. If microprocessor is operating, it will report most failures of heater power supply PS1 and analog power supply PS2 during system continuous self-test (CST). |
| 1 | Using large flat-tipped screwdriver, open present weather sensor main electrical enclosure access door. |
| 2 | Using No. 1 Phillips screwdriver, remove four screws and lockwashers securing access cover to ac junction box. |
| 3 | Remove access cover from ac junction box. |
| 4 | With power applied to present weather sensor, use DMM to check for 115 vac power between terminals 1 and 2 and between terminals 4 and 5 of terminal board TB1 inside ac junction box. If power is present, proceed to step 5. If not, ensure that all cables are connected properly and then troubleshoot ac power cables between DCP and present weather sensor. |
| 5 | Using DMM, verify 115 vac between terminals 1 and 2 of filter block TB2 on top of ac junction box. If power is present, proceed to step 6. If not, replace ac junction box. |
| 6 | At card rack assembly, disconnect digital power supply connector P15 from connector J15. |
| 7 | Using DMM, check the following pins for indicated voltages:<br><br>Negative lead / Positive lead / Reading<br>P15-1 / P15-4 / +5.0 vdc ±0.2 vdc<br>P15-2 / P15-9 / +12.0 vdc ±0.2 vdc<br>P15-2 / P15-7 / -12.0 vdc ±0.2 vdc<br><br>If any reading is incorrect, replace digital power supply PS3. If all readings are correct, reconnect P15 to J15 and proceed to step 8. |
| 8 | At card rack assembly, disconnect analog power supply connector P19 from connector J19. |
| 9 | Using DMM, check the following pins for indicated voltages:<br><br>Negative lead / Positive lead / Reading<br>P19-4 / P19-1 / -12.0 vdc ±0.2 vdc<br>P19-4 / P19-7 / +12.0 vdc ±0.2 vdc<br><br>If either reading is incorrect, replace analog power supply PS2. If both readings are correct, reconnect P19 to J19 and proceed to step 10. |
| 10 | At card rack assembly, disconnect heater power supply connector P17 from connector J17. |

**Table 7.5.5. Present Weather Power Supply Test -CONT**

| Step | Procedure |
|---|---|
| 11 | Using DMM, check the following pins for indicated voltages:<br><br>Negative lead: P17-1 — Positive lead: P17-5 — Reading: +24.0 vdc ±0.2 vdc<br><br>If reading is incorrect, replace heater power supply PS1. If reading is correct, connect P17 to J17. |
| 12 | Using No. 1 Phillips screwdriver, install four screws and lockwashers securing access cover to ac junction box. |
| 13 | Using large flat-tipped screwdriver, close and secure present weather sensor main electrical enclosure access door. |

**Table 7.5.6. Frame Head Assembly Removal and Installation**

| Step | Procedure |
|---|---|
| | **REMOVAL** |
| | Tools required:<br>3/16-inch hex key wrench<br>15 feet of rope<br>5/8-inch wrench<br>Sensor support device<br><br>**WARNING**<br><br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying heater and primary power to sensor are set to off (right) position. |
| 1 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to off (right) position. |
| 2 | Remove frame assembly (long white) ground wire from ground wire stud located on bottom of main electrical enclosure. |
| 3 | Disconnect frame cable connectors P4 and P5 from connectors J4 and J5 on main electrical enclosure. Feed all exposed cabling into access opening in sensor mounting column.<br><br>**WARNING**<br><br>Death or severe injury may result if personnel are not kept out of travel path of sensor. With locking pin removed from hinge plate, sensor is not firmly locked in upright position. |
| 4 | Lower present weather sensor on hinge plate as follows:<br><br>a. Remove locking pin from front part of hinge plate.<br><br>b. From rear of sensor, firmly grasp support pole with both hands and carefully lower sensor on hinge until lanyard catches and supports weight of sensor. |
| 5 | Using 3/16-inch hex key wrench at collar of frame mounting base plate, loosen four hex capscrews securing frame stem to mounting plate. |

**Table 7.5.6. Frame Head Assembly Removal and Installation -CONT**

| Step | Procedure |
|---|---|
| 6 | Gently raise frame assembly out of collar of mounting base plate, carefully pulling frame assembly cabling out behind it. |
| | **INSTALLATION** |
| | Tools required:<br>3/16-inch hex key wrench<br>15 feet of rope<br>5/8-inch wrench<br>Sensor support device<br><br>**WARNING**<br><br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that heater and primary power circuit breakers (located in DCP) supplying power to sensor are set to off (right) position. |
| 1 | Inside DCP equipment cabinet, ensure that circuit breakers on present weather sensor circuit breaker module are set to off (right) position. |
| 2 | Feed cables from sensor frame down through collar of frame assembly mounting base plate (down into mounting column) and gently lower stem of frame into collar of base plate. |
| 3 | At mounting column access hole (below main electrical enclosure), pull free ends of two frame assembly cables and frame assembly ground wire out of mounting column. |
| 4 | Position frame assembly so that sensor headpiece with horizontal slotted mask is facing north (±10 degrees). Raise frame assembly so that stem of frame is approximately 1/4 inch above bottom of mounting plate (not protruding out of mounting base). |
| 5 | Using 3/16-inch hex key wrench, tighten four hex capscrews in collar of mounting base to secure frame assembly. Do not overtighten screws; otherwise, lower end of mounting plate will become distorted and difficult to remove from mounting base. |
| 6 | Raise present weather sensor on hinge plate as follows:<br><br>a. From rear of sensor, firmly grasp support pole with both hands and carefully raise sensor on hinge into upright position.<br><br>b. Install locking pin into front of hinge plate. |
| 7 | Connect frame cable connectors P4 and P5 to connectors J4 and J5 on main electrical enclosure. |
| 8 | Connect frame assembly (long white) ground wire to ground wire stud located on bottom of main electrical enclosure. |
| 9 | Check operation of window heaters and hood heaters in accordance with paragraph 7.5.2.1. |
| 10 | Clean transmitter and receiver lenses in accordance with paragraph 7.5.2.2. |
| 11 | Calibrate present weather sensor in accordance with table 7.5.2. |

**Table 7.5.7. Heater Power Supply Removal and Installation**

| Step | Procedure |
|---|---|
| | **REMOVAL** |
| | Tools required:<br>Large flat-tipped screwdriver<br>No. 1 Phillips screwdriver<br>Long-nosed pliers<br>Long flat-tipped screwdriver<br><br>**WARNING**<br><br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying heater and primary power to sensor are set to off (right) position. |
| 1 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to off (right) position. |
| 2 | Using large flat-tipped screwdriver, open present weather sensor main electrical enclosure access door.<br><br>**NOTE**<br>Heater power supply A1PS1 is located on left side of main electrical enclosure. |
| 3 | Locate twisted pair of wires connecting heater power supply to terminals 1 and 2 of terminal board on top of ac junction box. Using No. 1 Phillips screwdriver, disconnect heater power supply wires from terminal board, but leave other wires connected to terminal board. |
| 4 | Using long-nosed pliers to grasp connector, on left side of card rack assembly, disconnect heater power supply cable from connector J17. |
| 5 | While supporting heater power supply, use long flat-tipped screwdriver to loosen four captive screws securing power supply to main electrical enclosure.<br><br>**NOTE**<br>Do not detach heater power supply from its own mounting plate. |
| 6 | Remove heater power supply from main electrical enclosure. |
| | **INSTALLATION** |
| | Tools required:<br>Long flat-tipped screwdriver<br>Long-nosed pliers<br>No. 1 Phillips screwdriver<br>Large flat-tipped screwdriver<br><br>**WARNING**<br><br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying heater and primary power to sensor are set to off (right) position. |
| 1 | Inside DCP equipment cabinet, ensure that circuit breakers on present weather circuit breaker module are set to off (right) position. |
| 2 | Using long flat-tipped screwdriver, install new heater power supply and tighten four captive screws securing power supply to main electrical enclosure. |
| 3 | Using long-nosed pliers to grasp connector, on left side of card rack assembly, connect heater power supply cable to connector J17. |

**Table 7.5.7. Heater Power Supply Removal and Installation -CONT**

| Step | Procedure |
|---|---|
| 4 | Using No. 1 Phillips screwdriver, connect two twisted pair wires from heater power supply to terminals 1 and 2 of terminal board on top of ac junction box. Leave other wires connected to terminals. |
| 5 | Check heater power supply in accordance with table 7.5.5, step 11. If power supply does not read 24vdc, adjust R11 for 24vdc ±.2vdc. |
| 6 | Using large flat-tipped screwdriver, close and secure present weather sensor main electrical enclosure access door. |

**Table 7.5.8. Analog Power Supply Removal and Installation**

| Step | Procedure |
|---|---|
| | **REMOVAL** |
| | Tools required:<br>Large flat-tipped screwdriver<br>No. 1 Phillips screwdriver<br>Long-nosed pliers<br>Long flat-tipped screwdriver<br><br>**WARNING**<br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying heater and primary power to sensor are set to off (right) position. |
| 1 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to off (right) position. |
| 2 | Using large flat-tipped screwdriver, open present weather sensor main electrical enclosure access door.<br><br>**NOTE**<br>Analog power supply A1PS2 is located toward top of main electrical enclosure. |
| 3 | Locate twisted pair of wires connecting analog power supply to terminals 1 and 2 of terminal board on top of ac junction box. Using No. 1 Phillips screwdriver, disconnect analog power supply wires from terminal board, but leave other wires connected to terminal board. |
| 4 | Using long-nosed pliers to grasp connector, on left side of card rack assembly, disconnect analog power supply cable from connector J19. |
| 5 | While supporting analog power supply, use long flat-tipped screwdriver to loosen four captive screws securing power supply to main electrical enclosure.<br><br>**NOTE**<br>Do not detach analog power supply from its own mounting plate. |
| 6 | Remove analog power supply from main electrical enclosure. |

**Table 7.5.8. Analog Power Supply Removal and Installation -CONT**

| Step | Procedure |
|---|---|
| | **INSTALLATION** |
| | Tools required:<br>Long flat-tipped screwdriver<br>Long-nosed pliers<br>No. 1 Phillips screwdriver<br>Large flat-tipped screwdriver<br><br>**WARNING**<br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying heater and primary power to sensor are set to off (right) position. |
| 1 | Inside DCP equipment cabinet, ensure that circuit breakers on present weather circuit breaker module are set to off (right) position. |
| 2 | Using long flat-tipped screwdriver, install new analog power supply and tighten four captive screws securing power supply to main electrical enclosure. |
| 3 | Using long-nosed pliers to grasp connector, on left side of card rack assembly, connect analog power supply cable to connector J19. |
| 4 | Using No. 1 Phillips screwdriver, connect two twisted pair wires from analog power supply to terminals 1 and 2 of terminal board on top of ac junction box. Leave other wires connected to terminals. |
| 5 | Check analog power supply in accordance with table 7.5.5, Step 9. |
| 6 | Calibrate present weather sensor in accordance with table 7.5.2. |
| 7 | Using large flat-tipped screwdriver, close and secure present weather sensor main electrical enclosure access door. |

**Table 7.5.9. Digital Power Supply Removal and Installation**

| Step | Procedure |
|---|---|
| | **REMOVAL** |
| | Tools required:<br>Large flat-tipped screwdriver<br>No. 1 Phillips screwdriver<br>Long-nosed pliers<br>Long flat-tipped screwdriver<br><br>**WARNING**<br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying heater and primary power to sensor are set to off (right) position. |
| 1 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to off (right) position. |
| 2 | Using large flat-tipped screwdriver, open present weather sensor main electrical enclosure access door.<br><br>**NOTE**<br>Digital power supply A1PS3 is located in middle of main electrical enclosure. |

**Table 7.5.9. Digital Power Supply Removal and Installation -CONT**

| Step | Procedure |
|---|---|
| 3 | Locate twisted pair of wires connecting digital power supply to terminals 1 and 2 of terminal board on top of ac junction box. Using No. 1 Phillips screwdriver, disconnect digital power supply wires from terminal board, but leave other wires connected to terminal board. |
| 4 | Using long-nosed pliers to grasp connector, on left side of card rack assembly, disconnect digital power supply cable from connector J15. |
| 5 | While supporting digital power supply, use long flat-tipped screwdriver to loosen four captive screws securing power supply to main electrical enclosure.<br><br>**NOTE**<br>Do not detach digital power supply from its own mounting plate. |
| 6 | Remove digital power supply from main electrical enclosure. |
| | **INSTALLATION** |
| | Tools required:<br>Long flat-tipped screwdriver<br>Long-nosed pliers<br>No. 1 Phillips screwdriver<br>Large flat-tipped screwdriver<br><br>**WARNING**<br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying heater and primary power to sensor are set to off (right) position. |
| 1 | Inside DCP equipment cabinet, ensure that circuit breakers on present weather circuit breaker module are set to off (right) position. |
| 2 | Using long flat-tipped screwdriver, install new digital power supply and tighten four captive screws securing power supply to main electrical enclosure. |
| 3 | Using long-nosed pliers to grasp connector, on left side of card rack assembly, connect digital power supply cable to connector J15. |
| 4 | Using No. 1 Phillips screwdriver, connect two twisted pair wires from digital power supply to terminals 1 and 2 of terminal board on top of ac junction box. Leave other wires connected to terminals. |
| 5 | Check digital power supply in accordance with table 7.5.5, Step 7. |
| 6 | Calibrate present weather sensor in accordance with table 7.5.2. |
| 7 | Using large flat-tipped screwdriver, close and secure present weather sensor main electrical enclosure access door. |

**Table 7.5.10. Circuit Board Removal and Installation**

| Step | Procedure |
|---|---|
| | **REMOVAL** |
| | Tools required:<br>Large flat-tipped screwdriver<br>Small flat-tipped screwdriver<br><br>**WARNING**<br><br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying heater and primary power to sensor are set to off (right) position. |
| 1 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to off (right) position. |
| 2 | Using large flat-tipped screwdriver, open present weather sensor main electrical enclosure access door. |
| 3 | At card rack assembly, locate circuit board to be removed. Using small flat-tipped screwdriver, loosen captive screws and remove circuit card. |
| | **INSTALLATION** |
| | Tools required:<br>Large flat-tipped screwdriver<br>Small flat-tipped screwdriver<br><br>**WARNING**<br><br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying heater and primary power to sensor are set to off (right) position. |
| 1 | Inside DCP equipment cabinet, ensure that circuit breakers on present weather circuit breaker module are set to off (right) position. |
| 2 | Position new circuit card in correct slot and using small flat-tipped screwdriver, tighten captive screws. |
| 3 | Calibrate present weather sensor in accordance with table 7.5.2. |
| 4 | Using large flat-tipped screwdriver, close and secure present weather sensor main electrical enclosure access door. |

**Table 7.5.11. Fiberoptic Module Removal and Installation**

| Step | Procedure |
|---|---|
| | **REMOVAL** |
| | Tools required:<br>Large flat-tipped screwdriver<br>Small flat-tipped screwdriver<br>No. 1 Phillips screwdriver<br><br>**WARNING**<br><br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying heater and primary power to sensor are set to off (right) position. |

**Table 7.5.11. Fiberoptic Module Removal and Installation -CONT**

| Step | Procedure |
|---|---|
| 1 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor power control module to off (right) position. |
| 2 | Using large flat-tipped screwdriver, open present weather sensor main electrical enclosure access door. |
| 3 | Using small flat-tipped screwdriver, loosen two retaining screws on DB-9 connector located on top of fiberoptic module. Remove connector DB-9. |
| 4 | Using No. 1 Phillips screwdriver, remove four screws and lockwashers securing ac junction box access cover. |
| 5 | Remove access cover from ac junction box. |
| 6 | Disconnect two fiberoptic cables from underneath fiberoptic module. Install protective plastic covers over fiberoptic connectors.<br><br>**NOTE**<br>Screws referenced in next step are located inside ac junction box. |
| 7 | Using small flat-tipped screwdriver, remove four screws, four lockwashers, and two gaskets securing fiberoptic module to ac junction box. |
| | **INSTALLATION** |
| | Tools required:<br>Small flat-tipped screwdriver<br>No. 1 Phillips screwdriver<br>Large flat-tipped screwdriver<br><br>**WARNING**<br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying heater and primary power to sensor are set to off (right) position. |
| 1 | Inside DCP equipment cabinet, ensure that circuit breakers on present weather sensor circuit breaker module are set to off (right) position. |
| 2 | With DB-9 connector toward the front, position fiberoptic module mounting plate and gasket on ac junction box. Using small flat-tipped screwdriver, install four lockwashers, four screws, and two gaskets securing fiberoptic module to ac junction box.<br><br>**NOTE**<br>Screws referenced in next step are installed inside (beneath module) ac junction box. |
| 3 | Remove protective plastic covers from fiberoptic connectors and install receive (RX) cable to front connector and transmit (TX) cable to rear connector on fiberoptic module. |
| 4 | Install access cover on ac junction box and using No. 1 Phillips screwdriver, install four screws and lockwashers securing access cover. |
| 5 | Install signal cable on connector DB-9 on fiberoptic module and using small flat-tipped screwdriver, tighten two retaining screws. |
| 6 | Using large flat-tipped screwdriver, close and secure present weather sensor main electrical enclosure access door. |
| 7 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker modules to on (left) position. |

**Table 7.5.12. Heater Bar Assembly Removal and Installation**

| Step | Procedure |
|---|---|
| | **REMOVAL** |
| | Tools required:<br>Large flat-tipped screwdriver<br>7/16-inch socket with ratchet<br>10-inch extension bar<br><br>**WARNING**<br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying electronics and heater power to sensor are set to the off (right) position. |
| 1 | Inside DCP equipment cabinet, ensure that electronics and heater circuit breakers on present weather sensor circuit breaker module are set to off (right) position. |
| 2 | Using large flat-tipped screwdriver, open present weather sensor main electrical enclosure access door.<br><br>**NOTE**<br>Heater bar is located on left side of main electrical enclosure. |
| 3 | Disconnect heater bar from main cable.<br><br>**CAUTION**<br>When removing nut from rear of heater bar, exercise care not to damage thermal switches or wires located on rear of ac junction box. |
| 4 | At heater bar, using 7/16-inch socket with ratchet and 10-inch extension bar, remove two nuts, lockwashers, and flat washers and remove heater bar. |
| | **INSTALLATION** |
| | Tools required:<br>7/16-inch socket with ratchet<br>10-inch extension bar<br>Large flat-tipped screwdriver<br><br>**WARNING**<br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying electronics and heater power to sensor are set to the off (right) position. |
| 1 | Inside DCP equipment cabinet, ensure that electronics and heater circuit breakers on present weather sensor circuit breaker module are set to off (right) position.<br><br>**CAUTION**<br>When installing nut from rear of heater bar, exercise care not to damage thermal switches or wires located on rear of ac junction box. |
| 2 | Using 7/16-inch socket with ratchet and 10-inch extension bar, install two nuts, flat washers, and lockwashers securing heater bar to main electrical enclosure supports. |
| 3 | Connect cable from heater bar to the associated main harness connector. |
| 4 | Using large flat-tipped screwdriver, close and secure present weather sensor main electrical enclosure access door. |
| 5 | Inside DCP equipment cabinet, set circuit breakers on present weather sensor circuit breaker module to on (left) position. |

**Table 7.5.13. Card Rack Assembly Removal and Installation**

| Step | Procedure |
|---|---|
| | **REMOVAL** |
| | Tools required:<br>Large flat-tipped screwdriver<br>Small flat-tipped screwdriver<br>Long-nosed pliers<br>No. 2 Phillips screwdriver<br><br>**WARNING**<br><br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying electronics and heater power to sensor are set to the off (right) position. |
| 1 | Inside DCP equipment cabinet, ensure that electronics and heater circuit breakers on present weather sensor circuit breaker module are set to off (right) position. |
| 2 | Using large flat-tipped screwdriver, open present weather sensor main electrical enclosure access door. |
| 3 | At card rack assembly, using small flat-tipped screwdriver, loosen captive screws on each circuit board and remove circuit board. |
| 4 | Using long-nosed pliers to grasp connectors, tag and disconnect cables located on left side of card rack. |
| 5 | Using small flat-tipped screwdriver, loosen two retaining screws on DB-9 connector located on top of fiberoptic module. Remove cable. |
| 6 | While supporting card rack and using No. 2 Phillips screwdriver, remove four screws, flat washers, and lockwashers and remove card rack. |
| | **INSTALLATION** |
| | Tools required:<br>Small flat-tipped screwdriver<br>Large flat-tipped screwdriver<br>Long-nosed pliers<br>No. 2 Phillips screwdriver<br><br>**WARNING**<br><br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying electronics and heater power to sensor are set to the off (right) position. |
| 1 | Inside DCP equipment cabinet, ensure that electronics and heater circuit breakers on present weather sensor circuit breaker module are set to off (right) position. |
| 2 | Using No. 2 Phillips screwdriver, install four screws, lockwashers, and flat washers securing card rack to main electrical enclosure. |
| 3 | Using long-nosed pliers and tags as a guide, connect main harness cables to connectors on left side of card rack. These connectors are keyed and can only be installed one way. |
| 4 | Using Section 7.1.2 as a guide, install circuit boards in card rack. Tighten captive screw securing each board to card rack. |
| 5 | Calibrate present weather sensor in accordance with table 7.5.2. |

**Table 7.5.14. Main Electrical Enclosure Removal and Installation**

| Step | Procedure |
|---|---|
| | **REMOVAL** |
| | Tools required:<br>No. 1 Phillips screwdriver<br>Large adjustable wrench<br>Large flat-tipped screwdriver<br>Small flat-tipped screwdriver<br>7/16-inch wrench<br>9/16-inch wrench<br><br>**WARNING**<br><br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying electronics and heater power to sensor are set to the off (right) position. |
| 1 | Inside DCP equipment cabinet, ensure that electronics and heater circuit breakers on present weather sensor circuit breaker module are set to off (right) position. |
| 2 | Using No. 1 Phillips screwdriver, remove four screws and lockwashers securing cover to ac junction box. Remove cover. |
| 3 | Using large adjustable wrench, disconnect flexible conduit from main electrical enclosure. |
| 4 | Using large flat-tipped screwdriver, open present weather sensor main electrical enclosure access door. |
| 5 | Using small flat-tipped screwdriver, tag and disconnect power input wires from terminal strip located inside ac junction box. |
| 6 | Disconnect two fiberoptic cables from underneath fiberoptic module. Install protective plastic covers over fiberoptic cable connectors. Pull fiberoptic and power cables out of enclosure. |
| 7 | Disconnect frame cable connectors P4 and P5 from connectors J4 and J5 on main electrical enclosure. |
| 8 | Using 7/16-inch wrench, disconnect frame assembly (long white) ground wire and site ground wire from ground stud located on bottom of main electrical enclosure. |
| 9 | Using 9/16-inch wrench, loosen but do not remove two bottom bolts securing main electrical enclosure to mounting column. |
| 10 | While supporting main electrical enclosure and using 9/16-inch wrench, remove two bolts, four flat washers, two lockwashers, and two nuts securing top of main electrical enclosure to mounting column and remove main electrical enclosure. |
| | **INSTALLATION** |
| | Tools required:<br>9/16-inch wrench<br>7/16-inch wrench<br>Large flat-tipped screwdriver<br>No. 1 Phillips screwdriver<br>Large adjustable wrench<br>Small flat-tipped screwdriver<br><br>**WARNING**<br><br>Death or severe injury may result if power is not removed from sensor prior to maintenance activities. Ensure that circuit breakers (located in DCP) supplying electronics and heater power to sensor are set to the off (right )position |
| 1 | Inside DCP equipment cabinet, ensure that electronics and heater circuit breakers on present weather sensor circuit breaker module are set to off (right) position |

**Table 7.5.14. Main Electrical Enclosure Removal and Installation - CONT**

| Step | Procedure |
|---|---|
| 2 | Position main electrical enclosure on two mounting bolts located in channel of mounting column. |
| 3 | Using 9/16-inch wrench, install two bolts, four flat washers, two lockwashers, and two nuts securing main electrical enclosure to mounting column. Tighten two mounting bolts located on bottom of main electrical enclosure. |
| 4 | Connect frame cable connectors P4 and P5 to connectors J4 and J5 on main electrical enclosure. |
| 5 | Using 7/16-inch wrench, connect frame assembly (long white) ground wire and site ground wire to ground stud located on bottom of main electrical enclosure. |
| 6 | Using large flat-tipped screwdriver, open main electrical enclosure access door. |
| 7 | Using No. 1 Phillips screwdriver, remove four screws and lockwashers securing access cover to ac junction box. Remove cover. |
| 8 | Route ac power wiring and fiberoptic cables through access hole in bottom of main electrical enclosure into ac junction box. |
| 9 | Using large adjustable wrench and hardware supplied, connect flexible conduit to main electrical enclosure. |
| 10 | Using small flat-tipped screwdriver, connect ac power wiring to terminal board in ac junction box according to the following connection chart:<br><br>Wire color / Terminal / Function<br>Black / TB1-1 / 120 vac (electronics)<br>White / TB1-2 / Neutral (electronics)<br>Green / TB1-3 / Chassis ground<br>Red / TB1-4 / 120 vac (heater)<br>Yellow / TB1-5 / Neutral (heaters) |
| 11 | Remove protective plastic covers from fiberoptic cable connectors underneath fiberoptic module and from fiberoptic cables. |
| 12 | Connect RX connector on fiberoptic cable to RX connector on fiberoptic module. Connect TX connector on fiberoptic cable to remaining connector on fiberoptic module. |
| 13 | Using No. 1 Phillips screwdriver, install four screws and lockwashers securing access cover to ac junction box. |
| 14 | Calibrate present weather sensor in accordance with table 7.5.2. |